Canadian Aviation Safety Board
Bureau canadien de la sécurité aérienne

PRELIMINARY AVIATION SAFETY STATISTICS

FOR 1989

Canada

90-05531/

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SUMMARY

The CASB's preliminary statistics show that accidents to Canadian aircraft decreased in 1989 compared to 1988 and the estimated accident rate (accidents per 100,000 hours flown) is the second lowest on record. However, the number of fatal accidents and fatalities both increased in 1989 versus 1988. Canada's Level I carriers (Air Canada, Canadian, and Wardair) achieved a perfect record of no accidents in 1989, and this was the sixth consecutive year in which there were no fatal accidents among Level I carriers.

Canadian registered civil aircraft were involved in 486 accidents in 1989, a three percent decrease from 1988. It is estimated that aviation activity (flying hours) increased by approximately 3.5% for the same period, which, if confirmed, would lead to a decline in the accident rate (from 14.5 accidents per 100,000 flying hours in 1988, to 13.5 in 1989).

Both the number of fatal accidents and the number of fatalities increased in 1989, compared to 1988. In 1988, there were 50 fatal accidents and 95 fatalities. In 1989, these numbers increased to 58 and 148 respectively. To some extent, the increase from 1988 can be attributed to a relatively low proportion of fatal accidents in 1988, 10.0% of the total, with the 1989 proportion increasing to 11.9% (about average for the 1980s). The high number of fatalities in 1989 reflects the single accident in Dryden, Ontario on March 10, in which 24 people lost their lives. In 1989, there were more fatalities in accidents involving Canadian aircraft than in any year since 1983.

CASB Regulations also require that certain categories of incidents (aviation occurrences other than accidents) be reported to the Board. The number of such mandatory reports received in 1989 which involved Canadian aircraft totalled 637 (an increase of 5%). In all cases, key data were recorded for trend analysis purposes. In addition, investigations were initiated into about 100 mandatory incident reports, including 35 reports of "risk of collision" incidents in the air.

Accidents involving ultralight aircraft (which are not included in the above statistics) increased slightly to 34 in 1989 versus 28 in 1988. However, this total is still well below the level of 50 to 60 per year in the mid 1980s. There were four fatal accidents involving ultralights in 1989 and four fatalities; in both cases, the 1989 totals were slightly below the 1988 results and the average for recent years.

The 1980s was a decade of significant improvement in aviation safety. The average annual number of accidents has decreased about 30% (from 700 to under 500); fatal accidents and fatalities have each decreased about 40% and the accident rate has declined from roughly 17 per 100,000 hours flown to about 14 (a 20% improvement).

TOTAL ACCIDENTS AND ACCIDENT RATE DECREASE

Following a significant drop from 1981 to 1982, the number of accidents continued to decline during the economic recession of the early 1980s. Since 1985, there has been a slight upward trend in the yearly totals as aviation activity also increased. The accident rate (accidents per 100,000 flying hours) declined quickly in the 1970s and early 1980s. Since 1982, the rate has remained in the 13.5 to 14.8 range but with a very slight downward trend over the seven year period.

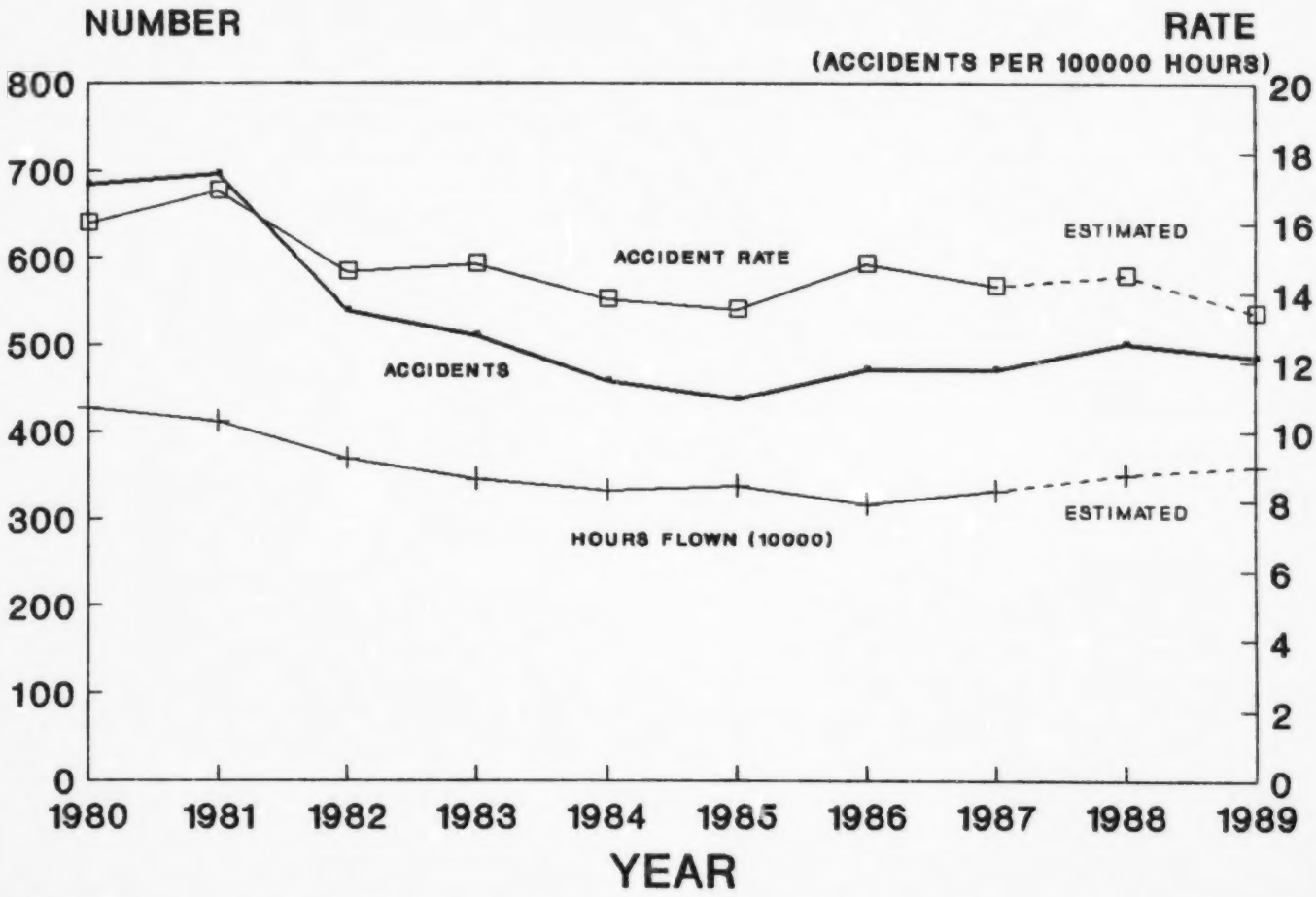
There were 486 accidents in 1989 (a decrease of 3%). This number coupled with an estimated 3.5% increase in flying hours to 3.6 million hours, yields an estimated accident rate of slightly more than 13.5 accidents per 100,000 flying hours. This rate is about 6% lower than that of 1988, and, if confirmed, will be the second lowest rate on record. (Before rounding, the 1989 estimate is 13.53 which compared with 13.45 in 1985).

The statistics for the past decade are presented graphically in Fig. 1. More detailed data are provided in Annex A (Table 1).

FIGURE 1

ACCIDENTS, HOURS FLOWN, ACCIDENT RATES 1980 TO 1989

CANADIAN REGISTERED AIRCRAFT



ULTRALIGHT AIRCRAFT EXCLUDED

FATAL ACCIDENTS, FATALITIES INCREASE

Despite the decrease in total accidents, the number of fatal accidents increased in 1989. There were 58 fatal accidents in 1989, compared with 50 in 1988. To some extent, this increase reflects the fact that 1988 was a year with a relatively low proportion of accidents that were fatal (10.0%), with 1989 returning to an historically more normal level (11.9%).

The number of fatalities increased quite substantially in 1989, compared with 1988. There were 148 fatalities last year compared with 95 in 1988. There was also a relatively high average number of fatalities per fatal accident in 1989. The following table presents these data, as well as comparisons since 1979.

FATAL ACCIDENTS FATALITIES BY YEAR*

YEAR	FATAL ACCIDENTS	% FATAL	FATALITIES	FATALITIES PER ACCIDENT
1979	109	15.0	254	2.3
1980	76	11.1	149	2.0
1981	88	12.7	172	2.0
1982	62	11.5	123	2.0
1983	63	12.4	148	2.3
1984	58	12.7	120	2.1
1985	40	9.1	71	1.8
1986	65	13.8	113	1.7
1987	53	12.3	97	1.8
1988	50	10.0	95	1.9
1989	58	11.9	148	2.7

* (Canadian registered aircraft, excluding ultralights.)

The relatively high number of fatalities in 1989 reflects the single accident in Dryden, Ontario in which 24 people were killed. Had this accident not occurred, there would still have been 124 fatalities from 57 fatal accidents. On average, this would then have been 2.2 fatalities per fatal accident, a figure close to historical averages.

During 1989 there were 8 accidents involving Canadian aircraft with 5 or more fatalities. Seven of these occurred in Canada, one occurred in the United States. These figures compare with an average of 3.8 accidents per year with 5 or more fatalities between 1979 and 1988. Those accidents that took place in 1989 are listed below.

ACCIDENTS DURING 1989 WITH 5 OR MORE FATALITIES

AIRCRAFT	OPERATOR	LOCATION	FATALITIES
Fokker F28	Air Ontario	Dryden, Ont.	24
Swearingen Metroliner III	Skylink Airways	Terrace, B.C.	7
DeHavilland DHC2	Sioux Narrows Airways	Taltheilei Narrows, N.W.T.	6
Piper Aztec	Private	Lac Laforge, P.Q.	6
Piper Aztec	Aquila Air Charters	Nanaimo, B.C.	5
Piper PA-31T3	Aklak Air	Sachs Harbour, N.W.T.	5
Piper PA-32	Private	Price's Corners, Ont.	5
Piper PA-60	Private	John Wayne Airport, California, U.S.A.	5

LEVEL I CARRIERS ACHIEVE ZERO ACCIDENT RATE; TOTAL COMMERCIAL REMAINS STABLE

During 1989, there were no accidents involving Level I Canadian air carriers (Air Canada, Canadian, and Wardair). In addition, 1989 was also the sixth consecutive year in which Level I carriers had no fatal accidents. Statistical comparisons by carrier level are not valid for years prior to 1981 because of a major definitional change in that year (lists of carriers by level are provided in Annex B).

Level II carriers were involved in 12 accidents during 1989. Three of these were fatal, resulting in 31 fatalities. The comparative figures for 1988 were: six accidents, two fatal accidents and a total of four fatalities. The increases in 1989 are at least partially explained by large increases in activity within the Level II category. While data on hours flown will not be available from the Aviation Statistics Centre for some time, it is estimated that the total will be in the order of 25% higher than in 1988. This would result in an accident rate of 2.5 per 100,000 hours flown; that rate would be somewhat higher than in recent years, but still below the average in the early 1980s as can be seen in Figure 2.

The total accident rate for all Canadian carriers in 1989 is estimated to be 8.8 (per 100,000 hours) which is essentially unchanged from 1988. It should be noted, however, that the hours flown data in this case have been estimated for both 1988 and 1989.

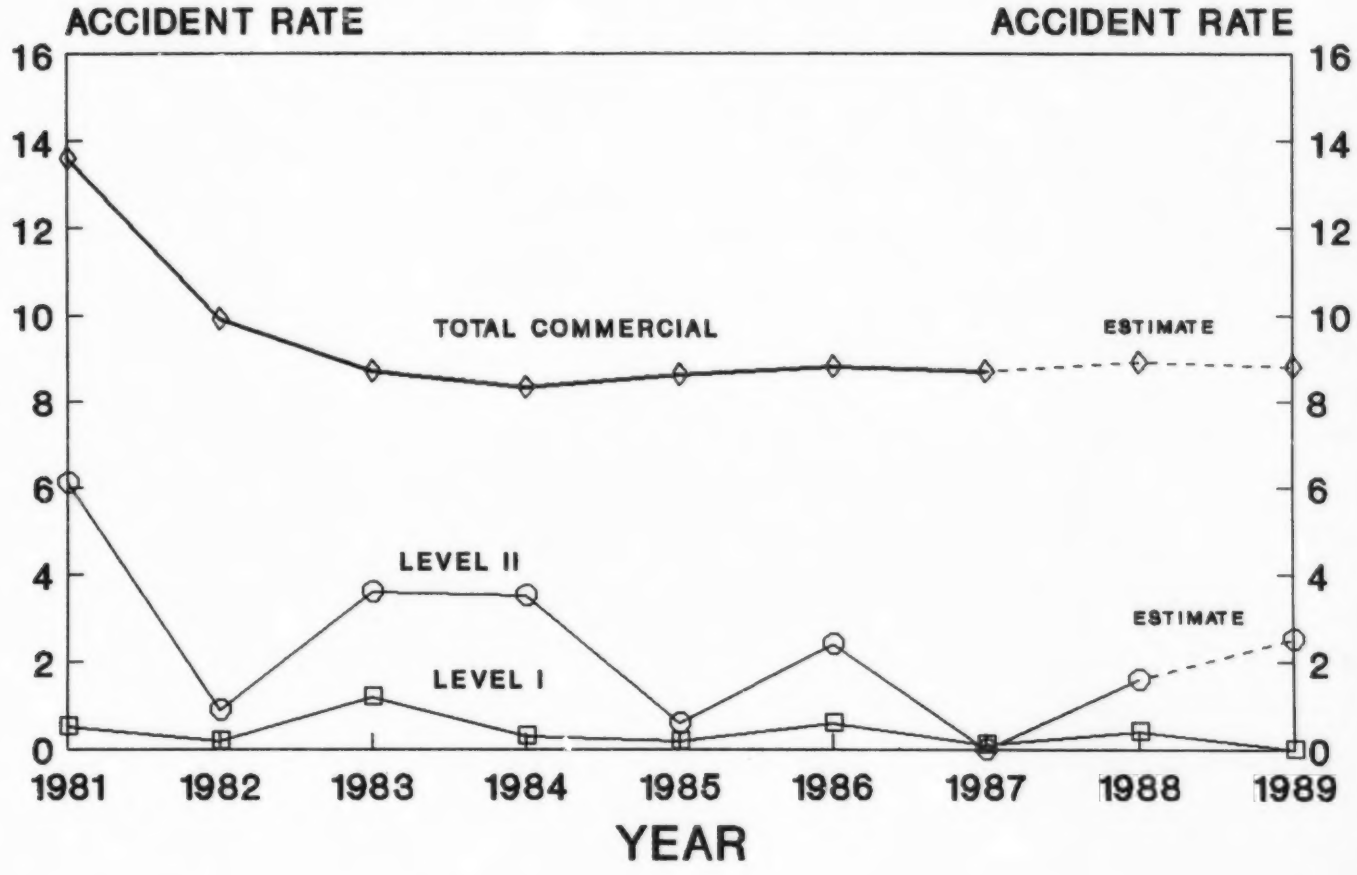
ACCIDENTS INCREASE FOR STATE AIRCRAFT, DECREASE FOR PRIVATE

Aircraft operated by the state, (federal, provincial or municipal governments, crown corporations) were involved in eight accidents during 1989; one was fatal and resulted in two deaths. These statistics compare with five accidents, one fatal accident, and one fatality in 1988. The increases of three accidents and one fatality versus 1988 are not considered significant. The accident rate for state-operated aircraft is not yet available for recent years pending the availability of data on hours flown..

The preliminary statistics for private aircraft show 227 accidents in 1989 versus 254 in 1988, a decrease of 11%. Meanwhile, fatal accidents increased from 24 to 34 and fatalities increased from 40 to 64. In all cases, the year-to-year changes are considered to be within normal statistical variation. Again, the absence of hours flown data for recent years preclude the estimation of an accident rate. However, the rate for private operations has historically been between two and three times that of commercial operations and it is likely still within that range.

FIGURE 2

ACCIDENT RATES
CANADIAN COMMERCIAL CARRIERS



ACCIDENTS BY CANADIAN REGION REMAIN STEADY

Figure 3 shows the distribution of accidents over the 1980-89 period. It should be noted that the numbers of accidents are shown in this chart without accident rates, as flying hours are not available.

There are inevitably some year to year variations in regional accident totals. However, it can be seen that the numbers of accidents in each region has remained relatively constant. In 1989, there were decreases in accidents in the Atlantic provinces, Quebec, and Ontario, and an increase in the Prairie provinces.

Recent incident statistics by province and territory are presented in the table below. Additional data by geographical region are contained in Annex A (Table 7).

ACCIDENTS TO CANADIAN REGISTERED AIRCRAFT

BY GEOGRAPHIC LOCATION

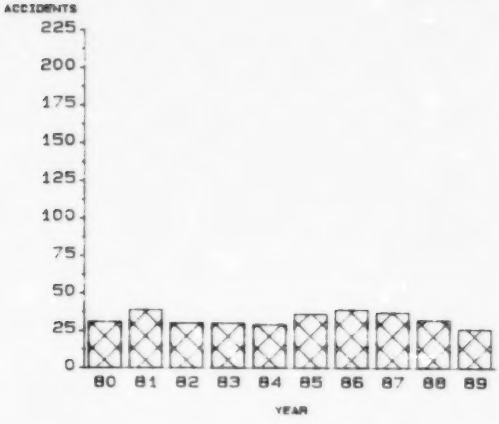
YEAR	1985	1986	1987	1988	1989
Newfoundland	15	13	12	18	12
Nova Scotia	7	8	11	7	7
P. E. I.	4	4	1	1	3
New Brunswick	10	14	13	6	4
Quebec	78	57	62	89	77
Ontario	118	138	111	133	119
Manitoba	44	47	30	35	39
Saskatchewan	28	42	40	40	37
Alberta	50	54	54	49	61
B. C.	58	75	108	87	89
Yukon	9	2	7	10	15
N. W. T.	12	15	21	18	11
Foreign	5	2	2	9	12

FIGURE 3

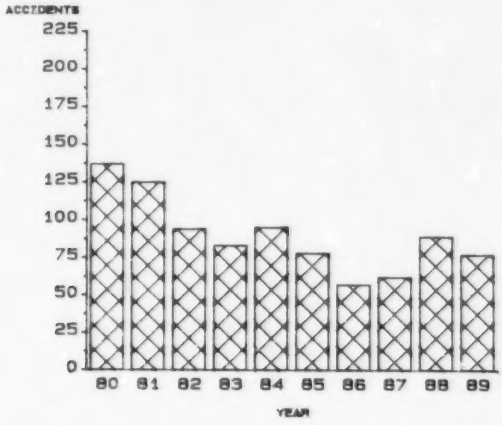
REGIONAL ACCIDENT TRENDS

NUMBER OF ACCIDENTS BY YEAR

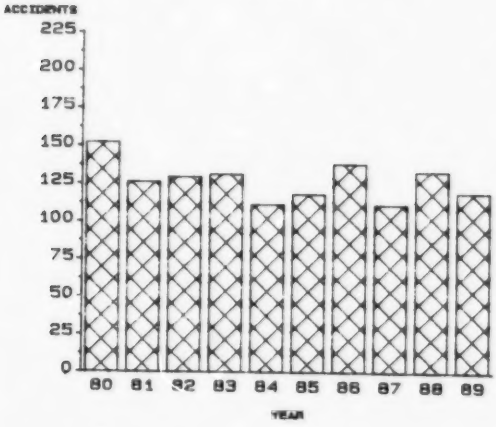
ATLANTIC CANADA



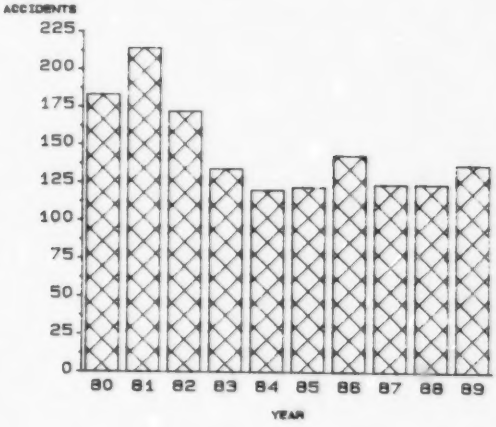
QUEBEC



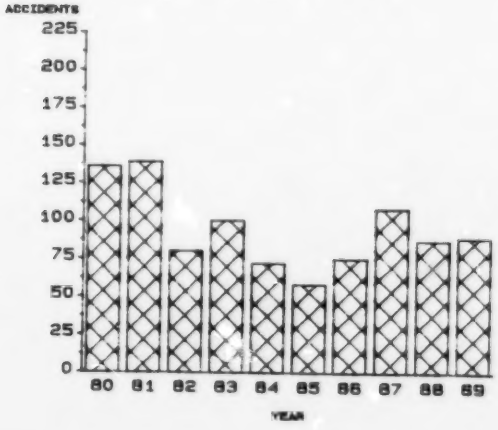
ONTARIO



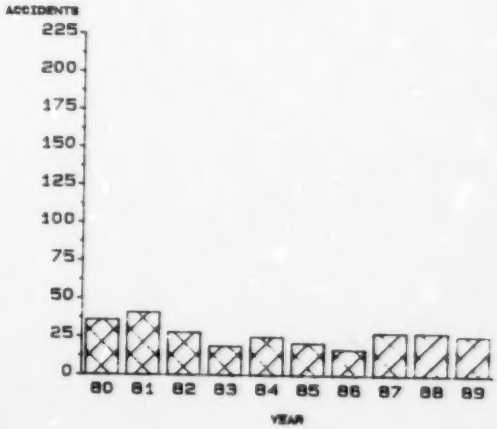
PRAIRIES



BRITISH COLUMBIA



YUKON, N.W.T.



NUMBER OF REPORTED INCIDENTS STEADY

Figure 4 depicts incidents reported under the mandatory reporting requirements of the CASB Regulations. There are 11 types of incidents that must be reported to the CASB provided that they involve an aircraft with maximum takeoff weight of 5700 kg. or greater. These are as follows:

- Engine failure
- Smoke or fire
- Loss of control in flight
- Wheels up landing or failure to remain in landing area
- Crew incapacitation
- Decompression
- Fuel exhaustion
- Incorrect or contaminated fuel
- Collision or risk of collision
- Declared emergency
- Leak of hazardous material

The CASB Regulations came into effect in December, 1984. Awareness of the requirement to report, and the knowledge of what constitutes a reportable incident has gradually been increasing within the aviation community, and may possibly not be complete yet.

The number of reported incidents involving Canadian aircraft increased by just under 5% in 1989 compared with 1988. This increase is of approximately the same magnitude as the estimated increase in hours flown. Increases were noted in declared emergencies, often related to system failures on the aircraft involved, and in risk of collision occurrences. There were fewer engine failure incidents in 1989 than in 1988.

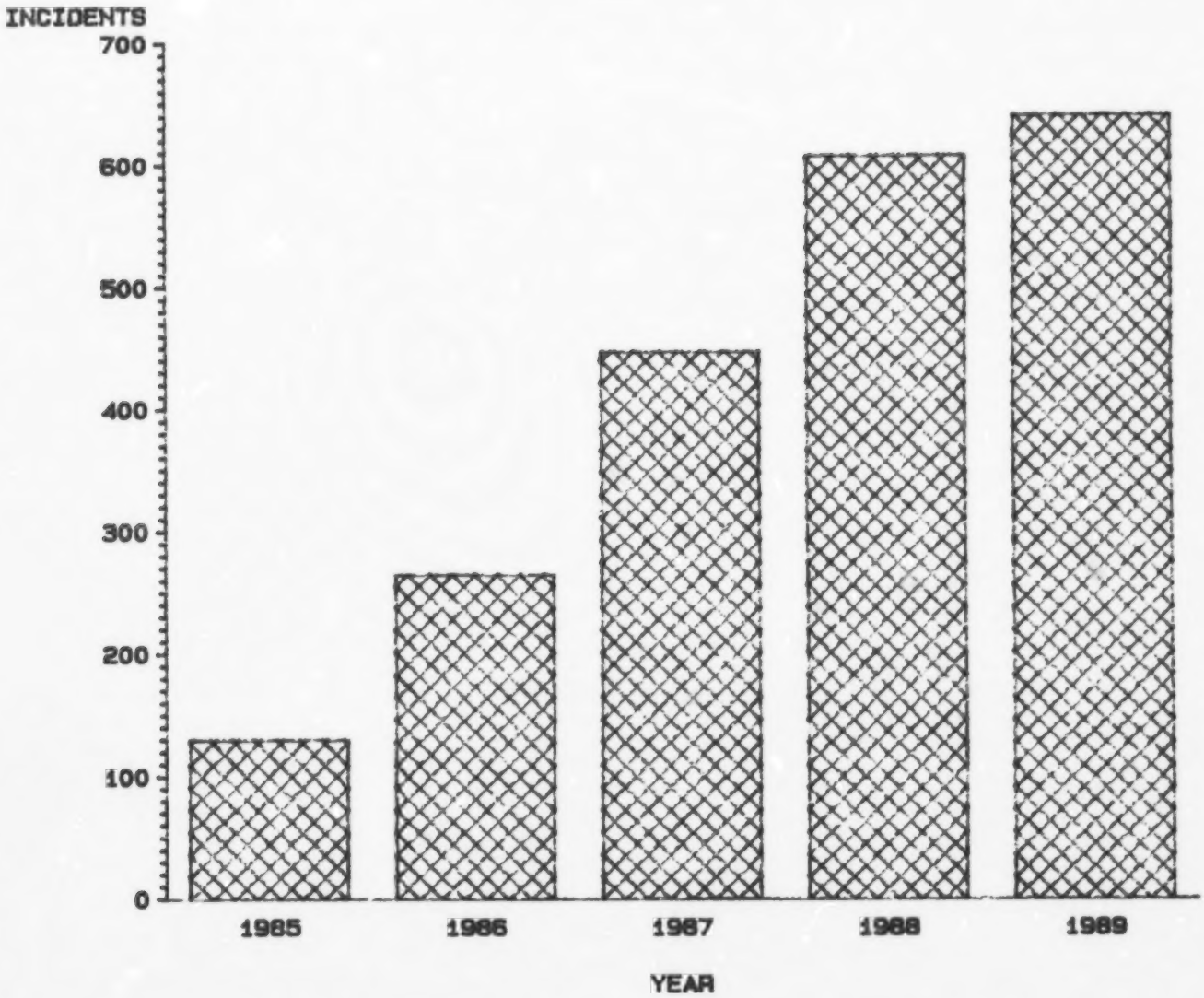
Risk of collision incidents reported to the CASB, which involved two aircraft in flight, at least one of which was over 5700 kg, and regardless of the country of aircraft registration, totalled 218 in 1989 (an increase of about 5% over 1988). Of these, 35 were investigated by the CASB and used as one of the data sources for the Board's special investigation into risk of collision occurrences. The draft report of that investigation is now under review by involved parties prior to the Board's completion of the final (public) report.

It should be noted that the above figure of 218 incidents cannot be directly compared with the "collision, risk of collision" incident statistics in Table 9 of Annex A. The figures in Table 9 exclude cases where no Canadian aircraft was involved, but include incidents on the ground as well as in flight.

FIGURE 4

INCIDENTS INVOLVING CANADIAN REGISTERED AIRCRAFT

MANDATORY REPORTED INCIDENTS BY YEAR



ACCIDENTS INVOLVING ULTRALIGHT AIRCRAFT INCREASE

No major changes in ultralight aircraft accident statistics.

The 1980s saw the emergence of the ultralight aircraft as a new component of aviation activity. Canadian regulations require that ultralight aircraft be registered, but there is no requirement to report flying hours or other measures of activity levels and so accident rates cannot be calculated. Therefore, accident statistics for ultralight aircraft are presented separately from other types of aviation activity.

During 1989, there were 34 ultralight aircraft accidents, 4 of which were fatal, with 4 fatalities involving this type of aircraft. This figure compares with 28 accidents, 6 fatal accidents and 8 fatalities during 1988. These data, along with the accident history from 1981 to date, are presented below.

ACCIDENTS INVOLVING ULTRALIGHT AIRCRAFT

YEAR	ACCIDENTS	FATAL ACCIDENTS	FATALITIES
1981	6	2	2
1982	24	11	11
1983	60	5	6
1984	60	7	8
1985	48	5	7
1986	52	5	5
1987	41	3	4
1988	28	5	6
1989	34	4	4

TRENDS DURING THE 1980s

During most of the 1970s and early 1980s, there were about 700 accidents annually involving Canadian registered aircraft. The number of accidents then decreased sharply, reaching a low of 438 accidents in 1985. Since then, accidents have demonstrated an increasing trend, consistent with the upturn in aviation activity. At the end of the eighties, there were just under 500 accidents annually.

As the number of accidents fell, so did the accident rate. Ten years ago, there were almost 20 accidents for every 100,000 flying hours. This figure fell in the early eighties, to just under 15 accidents. The accident rate has remained relatively stable ever since, though with a very slight downward trend if the estimates for 1988 and 1989 prove to be correct.

Despite the dramatic change in the numbers of accidents, the proportion of accidents that resulted in fatalities has generally been quite stable at about 10 to 12%. The number of fatalities, being more a measure of aircraft loading than of accident severity, has tended to be about twice the number of fatal accidents. Years in which there have been substantially more than two fatalities per fatal accident were those in which there was a major accident involving many deaths.

It is not so clear whether the numbers of incidents have followed the same pattern as the numbers of accidents. Prior to 1984, and the formation of the Canadian Aviation Safety Board, there was no regulatory requirement to file a report on any incident. When the CASB was formed, reporting of certain types of incidents was mandated, as explained earlier in this document. The numbers of reported incidents increased considerably through 1988, and appeared to level off in 1989. It is probable that a large part of the initial increase was due to learning of the reporting requirements in the aviation community. It is quite possible that this learning process is not yet complete.

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TABLE 1

ACCIDENTS, FATALITIES, BY YEAR. 1980 - 1989
CANADIAN REGISTERED AIRCRAFT

YEAR	ACCIDENTS	FATAL ACCIDENTS	FATALITIES	TOTAL HOURS FLOWN	TOTAL ACCIDENT RATE	FATAL ACCIDENT RATE
1980	684	76	149	4265188	16.0	1.8
1981	695	88	172	4123288	16.9	2.1
1982	539	62	123	3688713	14.6	1.7
1983	510	63	148	3447277	14.8	1.8
1984	458	58	120	3322200	13.8	1.7
1985	438	40	71	3256280	13.5	1.2
1986	471	65	113	3172506	14.8	2.0
1987	472	53	97	3321519	14.2	1.6
1988*	502	50	95	3500000	14.5	1.4
1989*	486	58	148	3600000	13.5	1.6

* Accident statistics for 1989 are preliminary; hours, rates for 1988, 1989 are estimated.

Accident and fatal accident rates are per 100,000 flying hours.

TABLE 2

ACCIDENTS TO CANADIAN REGISTERED AIRCRAFT
COMMERCIAL AIRCRAFT

YEAR	ACCIDENTS	FATAL ACCIDENTS	FATALITIES	TOTAL FLYING HOURS	TOTAL ACCIDENT RATE	FATAL ACCIDENT RATE
1980	351	39	89	2844179	12.3	1.4
1981	361	40	85	2661879	13.6	1.5
1982	233	32	73	2343394	9.9	1.4
1983	190	19	68	2173278	8.7	0.9
1984	181	27	62	2176118	8.3	1.2
1985	189	18	42	2203812	8.6	0.8
1986	202	29	48	2302880	8.8	1.3
1987	211	23	44	2420586	8.7	1.0
1988*	243	25	54	2600000	9.5	1.0
1989*	251	23	82	2700000	9.4	0.9

* Accident statistics for 1989 are preliminary; hours, rates for 1988, 1989 estimated.

Accident and fatal accident rates are per 100,000 flying hours.

TABLE 3

ACCIDENTS TO CANADIAN REGISTERED AIRCRAFT
LEVEL ONE CARRIERS

YEAR	ACCIDENTS	FATAL ACCIDENTS	FATALITIES	HOURS FLOWN	ACCIDENT RATE	FATAL ACCIDENT RATE
1981	3	0	0	661483	0.5	0.0
1982	1	0	0	620890	0.2	0.0
1983	7	1	23	587834	1.2	0.2
1984	2	0	0	610569	0.3	0.0
1985	1	0	0	659728	0.2	0.0
1986	4	0	0	690065	0.6	0.0
1987	1	0	0	705018	0.1	0.0
1988	3	0	0	759474	0.4	0.0
1989*	0	0	0	793000	0.0	0.0

* Accident statistics for 1989 are preliminary; hours flown and rates for 1989 are estimated.

Accident and fatal accident rates are per 100,000 flying hours.

TABLE 4

ACCIDENTS TO CANADIAN REGISTERED AIRCRAFT
LEVEL TWO CARRIERS

YEAR	ACCIDENTS	FATAL ACCIDENTS	FATALITIES	HOURS FLOWN	ACCIDENT RATE	FATAL ACCIDENT RATE
1981	9	1	6	147218	6.1	0.7
1982	1	0	0	110496	0.9	0.0
1983	4	1	4	111068	3.6	0.9
1984	4	0	0	113523	3.5	0.0
1985	1	0	0	154160	0.6	0.0
1986	4	0	0	172085	2.3	0.0
1987	0	0	0	182348	0.0	0.0
1988	6	2	4	384076	1.6	0.5
1989*	12	3	31	480000	2.5	0.6

* Accident statistics for 1989 are preliminary; hours flown and rates for 1989 are estimated.

Accident and fatal accident rates are per 100,000 flying hours.

TABLE 5

ACCIDENTS TO CANADIAN REGISTERED AIRCRAFT
STATE OPERATIONS

YEAR	ACCIDENTS	FATAL ACCIDENTS	FATALITIES	HOURS FLOWN	ACCIDENT RATE	FATAL ACCIDENT RATE
1980	4	2	2	118899	3.4	1.7
1981	8	1	2	125911	6.4	0.8
1982	5	1	1	133113	3.8	0.8
1983	7	1	2	124034	5.6	0.8
1984	5	0	0	118864	4.2	0.0
1985	5	0	0	118442	4.2	0.0
1986	4	1	4	105391	3.8	0.9
1987	4	1	1	N/A	N/A	N/A
1988	5	1	1	N/A	N/A	N/A
1989*	8	1	2	N/A	N/A	N/A

* Accident statistics for 1989 are preliminary.

Accident and fatal accident rates are per 100,000 flying hours.

TABLE 6

ACCIDENTS TO CANADIAN REGISTERED AIRCRAFT
PRIVATE OPERATIONS

YEAR	ACCIDENTS	FATAL ACCIDENTS	FATALITIES	HOURS FLOWN	ACCIDENT RATE	FATAL ACCIDENT RATE
1980	329	35	58	1300427	25.3	2.7
1981	326	47	85	1331677	24.5	3.5
1982	301	29	49	1212206	24.8	2.4
1983	313	43	78	1149965	27.2	3.7
1984	272	31	58	1027218	26.5	3.0
1985	244	22	29	934026	26.1	2.4
1986	265	35	61	764235	34.7	4.6
1987	257	29	52	N/A	N/A	N/A
1988	254	24	40	N/A	N/A	N/A
1989*	227	34	64	N/A	N/A	N/A

* Accident statistics for 1989 are preliminary.

Accident and fatal accident rates are per 100,000 flying hours.

TABLE 7
ACCIDENTS TO CANADIAN REGISTERED AIRCRAFT 1980 - 1989
BY PROVINCE/REGION

	ATLANTIC		QUEBEC		ONTARIO		PRAIRIES		B. C.		TERRITORIES	
YEAR	ACCIDENTS	FATAL ACCIDENTS	ACCIDENTS	FATAL ACCIDENTS	ACCIDENTS	FATAL ACCIDENTS	ACCIDENTS	FATAL ACCIDENTS	ACCIDENTS	FATAL ACCIDENTS	ACCIDENTS	FATAL ACCIDENTS
1980	31	4	137	16	152	15	183	16	136	19	36	4
1981	39	6	125	15	126	12	214	20	139	28	41	4
1982	30	2	94	8	129	9	172	17	80	18	28	5
1983	30	3	83	9	131	13	134	9	100	17	19	5
1984	29	5	95	11	111	7	120	13	72	15	25	5
1985	36	2	78	9	118	5	122	10	58	10	21	1
1986	39	2	57	11	138	9	143	20	75	21	17	2
1987	37	5	62	12	111	11	124	11	108	12	28	2
1988	32	3	89	8	133	15	124	8	87	10	28	1
1989*	26	2	77	9	119	15	137	6	89	18	26	2

* ACCIDENT STATISTICS FOR 1989 ARE PRELIMINARY

TABLE 8
ACCIDENTS AND RATES TO FIXED WING VERSUS ROTARY WING BY YEAR, 1980 - 1989
CANADIAN REGISTERED AIRCRAFT

	FIXED WING AIRCRAFT						ROTARY WING AIRCRAFT					
YEAR	NO. OF AIRCRAFT	FLYING HOURS MILLIONS	ACCIDENTS	FATAL ACCIDENTS	ACCIDENT RATE	FATAL ACCIDENT RATE	NO. OF AIRCRAFT	FLYING HOURS MILLIONS	ACCIDENTS	FATAL ACCIDENTS	ACCIDENT RATE	FATAL ACCIDENT RATE
1980	17745	3.67	582	62	15.5	1.7	1146	0.59	99	14	16.8	2.4
1981	17156	3.50	570	72	16.0	2.1	1132	0.62	122	15	19.7	2.4
1982	17472	3.19	482	55	14.6	1.7	1072	0.50	54	7	10.8	1.4
1983	16879	3.01	456	56	14.9	1.8	983	0.43	53	7	12.3	1.6
1984	16699	2.93	417	55	14.1	1.9	937	0.39	38	3	9.7	0.8
1985	16584	2.87	384	34	12.9	1.1	899	0.39	52	6	13.3	1.5
1986	17040	2.79	423	58	14.9	2.1	939	0.38	47	7	12.4	1.8
1987	15259	2.90	411	42	13.7	1.4	895	0.42	55	9	13.1	2.1
1988	N/A	N/A	438	41	N/A	N/A	N/A	N/A	59	8	N/A	N/A
1989*	N/A	N/A	419	49	N/A	N/A	N/A	N/A	59	8	N/A	N/A

* ACCIDENT STATISTICS FOR 1989 ARE PRELIMINARY

TABLE 9

REPORTABLE INCIDENTS INVOLVING CANADIAN REGISTERED AIRCRAFT

1985 - 1989

INCIDENT TYPE	1985	1986	1987	1988	1989*
ENGINE FAILURE	56	100	141	185	148
FIRE	18	30	60	63	61
LOSS OF CONTROL	5	10	8	52	33
LANDING TAKEOFF PROBLEMS	3	20	11	15	12
CREW INCAPACITATION	0	2	0	5	3
DECOMPRESSION	1	9	9	9	13
FUEL SHORTAGE	1	2	1	7	2
DIRTY/INCORRECT FUEL	1	1	0	0	0
COLLISION, RISK OF COLLISION	40	66	134	172	186
DECLARED EMERGENCY	5	20	83	98	178
DANGEROUS CARGO LEAK	0	5	0	1	1
TOTAL	130	265	447	607	637

* Statistics for 1989 are preliminary.

ANNEX B - DEFINITIONS

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DEFINITIONS (CASB ACT AND REGULATIONS)

"aviation occurrence" means (a) any accident or incident associated with the operation of an aircraft, and (b) any situation or condition that the Board has reasonable grounds to believe could, if left unattended, induce an accident or incident described in paragraph (a);

"accident" means any aviation occurrence where, at any time during the period commencing when the first person boards an aircraft for the purpose of flight and ending when the last person disembarks from the aircraft after the flight,

a) a person, other than a stowaway, sustains a serious injury or fall injury, that is not self inflicted or inflicted by another person or caused by natural causes, as a result of that person

   i) being in the aircraft

   ii) coming into direct contact with any part of the aircraft, including any part that may have become detached from the aircraft, or

   iii) being directly exposed to the jet blast of the aircraft,

b) the aircraft sustains damage or structural failure adversely affecting the structural strength, performance, or flight characteristics of the aircraft and normally requiring major repair or replacement of any affected component part, other than damage or failure that is limited to

   i) the engine, its cowlings, or its accessories

   ii) the propellers, wing tips, antennae, tires, brakes or fairings, or

   iii) small dents or puncture holes in the aircraft skin,

or

c) the aircraft is missing or completely inaccessible;

"incident" means an aviation occurrence, other than an accident that affects or could affect the safe operation of an aircraft;

"reportable incident" means any incident involving an aircraft with a maximum certified take-off weight greater than 5,700 kg. where

a) an engine fails,

b) smoke or fire occurs, other than an engine fire that is contained within the engine and does not result in engine failure or damage to other component parts of the aircraft,

c) difficulties in controlling the aircraft in flight are encountered due to any aircraft system malfunction, weather phenomena, wake turbulence, operations outside the approved flight envelope, or uncontrolled vibrations,

d) the aircraft fails to remain within the intended landing or take-off area, lands with one or more landing gear retracted, or drags a wing tip or engine pod,

e) any crew member is unable to perform his flight duties as a result of incapacitation

f) decompression, explosive or otherwise, occurs that necessitates an emergency descent,

g) a fuel shortage occurs that necessitates a diversion or requires approach and landing priority at the destination of the aircraft,

h) the aircraft is refuelled with the incorrect type of fuel or contaminated fuel that is undetected prior to departure from the ramp,

i) a collision or risk of collision with any other aircraft or with any vehicle, terrain or obstacle that may be related to air traffic control procedures or equipment failures,

j) a flight crew member declares an emergency or indicates any degree of emergency that required priority handling by an air traffic control unit or the standing by of crash, fire fighting or rescue services, or

k) toxic gasses or corrosive materials leak from any cargo aboard the aircraft;

DEFINITIONS OF AIR CARRIER LEVELS

In past years, air carrier accidents statistics were sub-divided according to type of operation based on class of licence as defined by the Air Transport Committee of the Canadian Transport Commission (CTC). For example, licence classes 1 and 8 referred to "scheduled" operations (domestic and international), and classes 4 and 7-4 referred to domestic and international "charter" operations. With Economic Regulatory Reform, and the replacement of the CTC by the National Transportation Agency, these definitions are no longer valid. However, there remains a need to sub-divide the accident statistics for safety analysis purposes. Furthermore, the public has an interest in the safety levels for the various types of operations conducted by Canada's commercial air carriers (and especially for those extensively involved in passenger transportation).

Air carriers are still categorized according to the size of their operations for the purposes of filing operating statistics with Statistics Canada. As the definitions of each carrier level have changed in the recent past, it is difficult to directly compare accident records over time without considering which airlines are included in each group. Therefore, the following definitions and lists of carriers in levels one and two are provided.

LEVEL ONE AIR CARRIERS

Canadian level one air carriers are presently defined as carriers that, in each of the two years immediately preceding the reported year carried one million or more revenue passengers, two hundred thousand or more tonnes of revenue goods or both.

1988 - 1989	Air Canada, Canadian Airlines International, Wardair
1987	Air B.C., Air Canada, Canadian Airlines International, Quebecair, Wardair
1981 - 1986	Air Canada, CP Air, Eastern Provincial Airways, Pacific Western Airlines, Nordair, Quebecair, Wardair

NOTE: A major definitional change took place in 1981 when the four "regional carriers" (EPA, PWA, Nordair and Quebecair) plus Wardair were re-designated as level one carriers and nine carriers were moved from level three to level two.

LEVEL TWO AIR CARRIERS

Canadian level two air carriers are presently defined as carriers not assigned to level one or licensed solely to serve the transportation requirements of a lodge operation, that, in each of the two years preceding the reporting year, carried fifty thousand or more revenue passengers, ten thousand or more tonnes of revenue goods or both.

1989 Air Atlantic, Air B.C., Air Nova, Air Ontario, Aklak Air, Bearskin Lake Airways, Bradley Air Services, Calm Air, Canadian Partner, City Express, Kelowna Flightcraft, Nationair, Norontair, Northland Air Manitoba, Northwest Territorial Airways, Quebecair, Soundair, Time Air, Worldways Canada

1988 Air Atlantic, Air B.C., Air Nova, Air Ontario, Bradley Air Services, Calm Air, City Express, Kelowna Flightcraft, Nationair, Norontair, Northland Air Manitoba, Northwest Territorial Airways, Quebecair, Soundair, Time Air, Worldways Canada

1987 Air Ontario, Bradley Air Services, Kelowna Flightcraft, Nationair, Norcanair, Northwest Territorial Airways, Time Air, Transprovincial Airways, Worldways Canada

1985 - 1986 Air B.C., Air Ontario, Austin Airways, Bradley Air Services, Kelowna Flightcraft, Norcanair, Northwest Territorial Airways, Time Air, Transprovincial Airways, Worldways Canada

1982 - 1984 Air B.C., Air Ontario, Austin Airways, Bradley Air Services, Norcanair, Northwest Territorial Airways, Time Air, Transprovincial Airways

1981 Air B.C., Air Ontario, Austin Airways, Bradley Air Services, Norcanair, Northwest Territorial Airways, Time Air, Transprovincial Airways

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